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# **PROPULSION DIRECTORATE**

## **Monthly Accomplishment Report February 2006**

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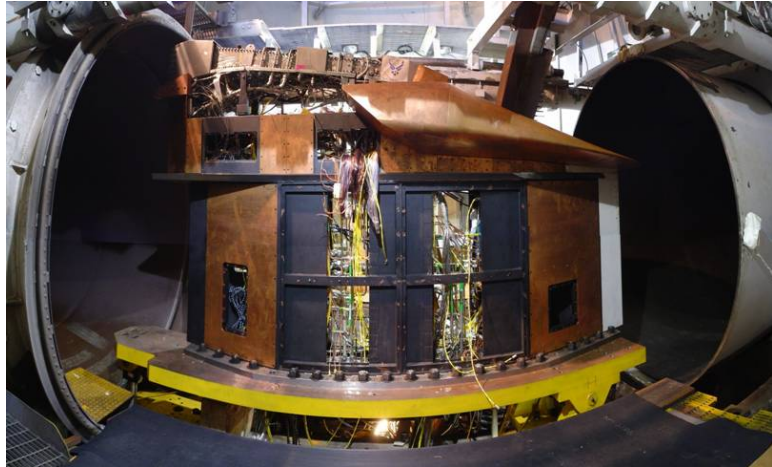
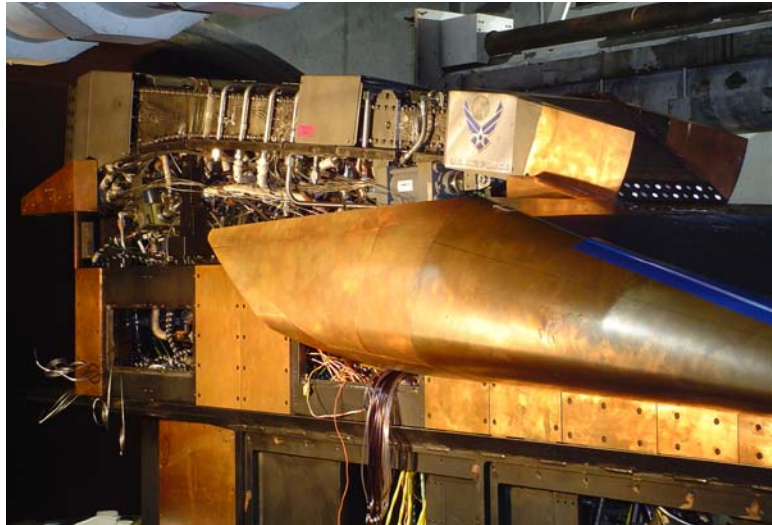


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**GDE-2 TESTING COMMENCES – FIRST TEST OBJECTIVE MET:** The Propulsion Directorate recently commenced testing of the Ground Demonstration Engine #2, or GDE-2, in NASA Langley Research Center's (LaRC) 8-foot High Temperature Tunnel in Hampton, Virginia. The GDE-2 is a hydrocarbon-fueled scramjet engine featuring a single integrated flow path, fuel control system, and closed-loop thermal management system. The first objective of this test series, an assessment of the engine's inlet performance and operability as a function of cowl lip position at Mach 5, was successfully completed on 15 February 2006. To meet this objective, a tare run was performed with the movable inlet flap positioned at various angles. As testing continues, other test objectives will include an assessment of a closed-loop hydrocarbon fuel system with a Full Authority Digital Engine Controller (FADEC), an assessment of the structural design, and verification of various design tools (e.g., aerothermal, structural, controls, etc). The ultimate objective of this test program is to develop technologies for future hypersonic propulsion systems, which have application to rapid response strike and access-to-space missions. This test program is a collaborative effort between the Air Force, Pratt & Whitney Rocketdyne, who built the GDE-2 engine, and NASA LaRC, who is providing the test facility and test support. This program is also an invaluable risk reduction effort for the scramjet engine that is to power X-51A flight test vehicle, which is currently scheduled to fly in December 2008. (Ms. Patricia Pearce, AFRL/PRAT, (937) 255-7294)



The GDE-2 mounted in the 8-foot High Temperature Tunnel at NASA Langley Research Center

**MR. HUGGINS EARNS TOP CIVILIAN HONOR:** The Propulsion Directorate's Mr. Michael Huggins recently received the Decoration for Exceptional Civilian Service. Mr. Huggins was recognized for his leadership as Chief of AFRL/PR's Space and Missile Propulsion Division (AFRL/PRS), Edwards AFB, California, from December 2001 to May 2005. The Decoration for Exceptional Civilian Service Award is the highest Air Force recognition granted to civilian employees. It is awarded to those individuals who have demonstrated extraordinary accomplishments for at least one year resulting in profound Air Force-wide impact to programs



Mr. Michael Huggins recently received the Decoration for Exceptional Civilian Service



Dr. James Scofield was recently selected to receive a 2006 FLC Award for Excellence in Technology Transfer

or projects. Mr. Huggins was honored for the strong national leadership he provided to the Integrated High Payoff Rocket Propulsion Technology (IHPRT) Program, which will double rocket propulsion capability by 2010. Through his dedicated efforts, he has built the strongest ties in decades between his division and his Air Force warfighting customers. Furthermore, he has championed outreach programs that have strengthened AFRL's ties to the rocket propulsion industry and educational institutions. His distinctive achievements, dedication, and contributions to the Air Force make him most deserving of this special recognition. (Mr. Jeff Pearce, AFRL/PR (UTC), (937) 255-5015)

#### DR. SCOFIELD WINS TECH TRANSFER

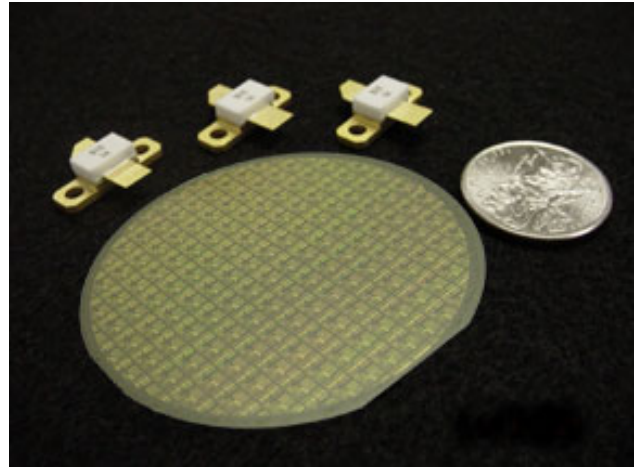
AWARD: The Propulsion Directorate's Dr. James Scofield was recently selected as the winner of a prestigious 2006 Award for Excellence in Technology Transfer. This award, presented annually by the [Federal Laboratory Consortium for Technology Transfer](#) (FLC), recognizes laboratory employees who have accomplished outstanding work in the process of transferring a technology developed by a federal laboratory to the commercial marketplace. Dr. Scofield is being recognized for his work in the area of silicon carbide (SiC) power devices. Dr. Scofield transferred technology and provided leadership, in collaboration with Mississippi State University, to incubate [SemiSouth Laboratories, Inc.](#) This collaboration made SiC fabrication practical for power devices. Dr. Scofield also implemented a Dual Use Science and Technology agreement with manufacturer [Cree, Inc.](#), who successfully commercialized the first SiC power device (i.e., the SiC Schottky diode) using federal technology. SiC power devices are now used in electronic power supplies, motor drives, and power conversion equipment throughout



the world. The commercial and industrial applications for this technology are vast and will have a tremendous impact on reducing electrical energy consumption for lighting and consumer/industrial electronics. Dr. Scofield will receive his FLC award on 3 May 2006 at the FLC National Meeting in Minneapolis, Minnesota. (Mr. Joseph Weimer, AFRL/PRPE, (937) 255-6236)

#### INTEGRATED POWERHEAD DEMO TEAM WINS ENGINEERING AWARD:

The Integrated Powerhead Demonstration (IPD) Test Team was recently presented with the Distinguished Engineering Project Achievement Award by the [San Fernando Valley Engineers' Council](#) (SFVEC). The SFVEC presents the Distinguished Engineering Project Achievement Award annually to recognize public or private organizations that have brought to fulfillment engineering projects that, because of their scope or unique character, are outstanding and deserving of merit. The IPD Program is a joint Air Force/NASA program partnered with industry (Pratt & Whitney Rocketdyne and Aerojet). The IPD team successfully demonstrated the first operation of the full flow staged combustion cycle, the first new liquid rocket engine cycle developed in over thirty years. Mr. Stephen Hanna, IPD Program Manager in the Propulsion Directorate's Space and Missile Propulsion Division (AFRL/PRS), was part of the winning team. The IPD Test Team was recognized at the SFVEC's 51<sup>st</sup> Annual Honors & Awards Banquet celebrating National Engineers Week on 25 February 2006. (Mr. Stephen G. Hanna, AFRL/PRSE, (661) 275-6021)



A recently commercialized JFET power device



Mr. Stephen Hanna was part of the team that won a Distinguished Engineering Project Achievement Award from the San Fernando Valley Engineers' Council



An IPD test at NASA Stennis Space Center, Mississippi

MODELING AND SIMULATION WORKSHOP A RESOUNDING SUCCESS: AFRL and DoE's [National Energy Technology Laboratory](#) (NETL) co-sponsored a workshop on the Future of Modeling and Simulation for Combustion Applications in Pittsburgh, Pennsylvania, from 21-23 February 2006. Approximately 120 persons attended the workshop representing a wide variety of organizations, including: AFRL, the Army, the Navy, four NASA centers (the Jet Propulsion Laboratory, Marshall Space Flight Center, Glenn Research Center, and Langley Research Center), AFOSR, the National Science Foundation (NSF), the National Institute of Standards and Technology (NIST), NETL, industry, academia, and small business. The objective of the workshop was to learn what modeling and simulation needs different applications may share in common, thus constituting opportunities for collaboration, and which needs are unique to each application. Experts in modeling and simulation and in experimental diagnostics discussed the modeling and simulation needs of five applications: liquid rockets, solid rockets, stationary gas turbines, gas turbines and augmentors for propulsion, and ramjets/scramjets. [Mr. Carl Bauer](#), NETL director, Mr. Robert Sackheim, NASA Assistant Director and Chief Engineer for Propulsion, and [Dr. Mark Lewis](#), Air Force Chief Scientist gave keynote addresses. There was general agreement that the forum providing many opportunities for team-building and for collaborations. The participants acknowledged that the presentations were of high value and deemed the workshop a resounding success. The materials presented at the workshop will be made into a report. (Dr. Doug Talley, AFRL/PRSA, (661) 275-6174)